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Utilization of AI in Disaster Response

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Disaster Response and ICT

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With the realization of a ubiquitous network society, we entered into a realm wherein people and things were connected through the IoT, and a myriad of knowledge and information was shared.

In Japan "Society 5.0" was proposed in Priority Policies in Comprehensive Strategy on Science, Technology, and Innovation 2017 to solve the associated problems and overcome unresolved challenges.

A disaster prevention and risk reduction system has been established as an application of the Society 5.0 platform, and expectations with regard to the use of cutting-edge technological benefits in disaster response have steadily grown.

Our goal is to establish design methodologies for development of effective disaster management systems against various types of disaster for National/Local Government, local communities in affected areas and disaster relief organizations.

Disaster Cycle

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Normal time

During a disaster

Disaster

Mitigation of Damage

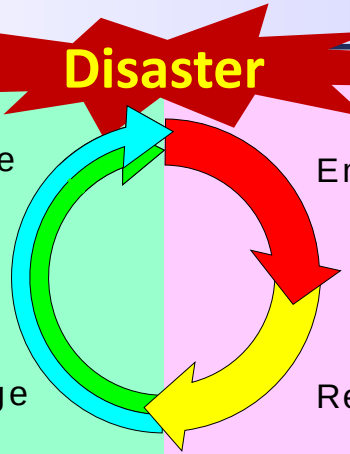
Emergency Response

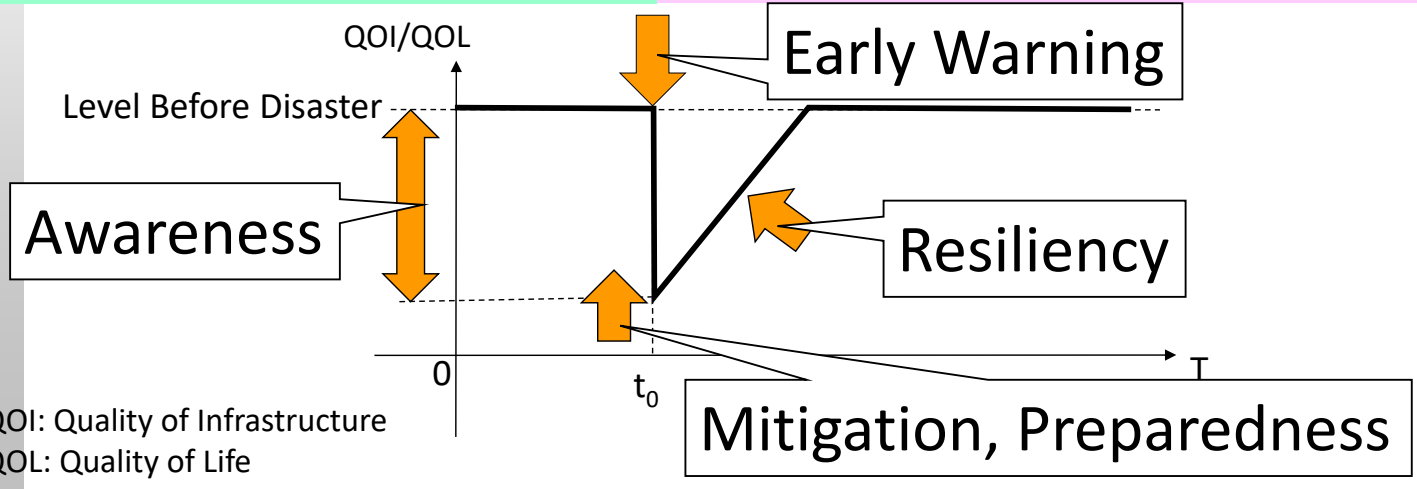
Risk Management

Crisis Management

Prevention of Damage

Recovery and Restoration





QOI: Quality of Infrastructure
QOL: Quality of Life

Disaster Response

In what kind of situations would we have failures of Disaster Response?

Natural Disaster,
Pandemic,
Terrorist attack, ...

Timely Decision Making
Under Uncertain Circumstance

Cognitive Gap Between Imagination and Real Situation

Unprecedented Events
- Great East Japan EQ
- COVID-19
- …

From experiences
From assumption

Information Collection

Disaster Response

Act with
Normative Approach
and
Adaptive Approach

Government Officials are good at normative

Standardization

New Technology

Information Technology

Local Communities are good at adaptive

Lesson Learned from
Past Disaster Response

Decision Making Support
Information System
For Disaster Response

Decision Making Support System

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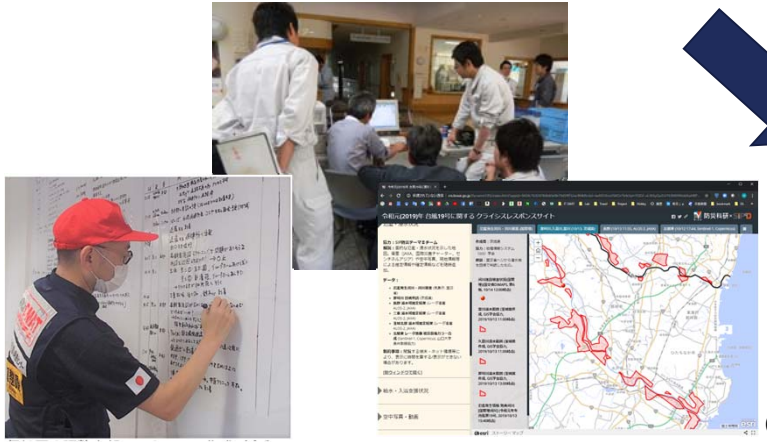
Information Management

Key Issues of Crisis Response

When

Chronology
Timeline



Where

GNSS+GIS

GNSS: Global Navigation Satellite System
GIS: Geographic Information System

Ever-changing Real Time Information with Location

Short-term forecasts are effective in supplementing scarce information.

Disaster X ICT

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Disaster X GIS
Disaster X Communication
} Platform

Disaster X IoT
Disaster X Big Data Analysis
Disaster X Multi-Agent Simulation
Disaster X Natural Language Processing
Disaster X Deep Learning
} AI

Disaster X Robot

Roof-damaged Buildings Estimation System based on Aero Photo using Deep Learning in Earthquake Disaster

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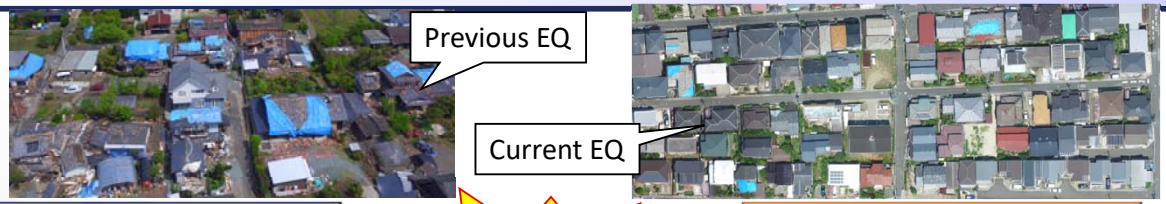

Learning Step

Aero photo

Location information of buildings polygon

Trimming

Database of roof images

Deep Learning

label (damage or not)

AI

Image recognition model

Earthquake happen

Running Step

Aero photo

GIS

Location information of buildings polygon

Trimming

Database of roof images

Predict

AI

Image recognition model

Overall view of damage buildings

OpenStreetMap Japan 自由な地図をみんなの手に

CRISmappers

Local Gov.

Prediction Result in Northern Osaka EQ(2018)

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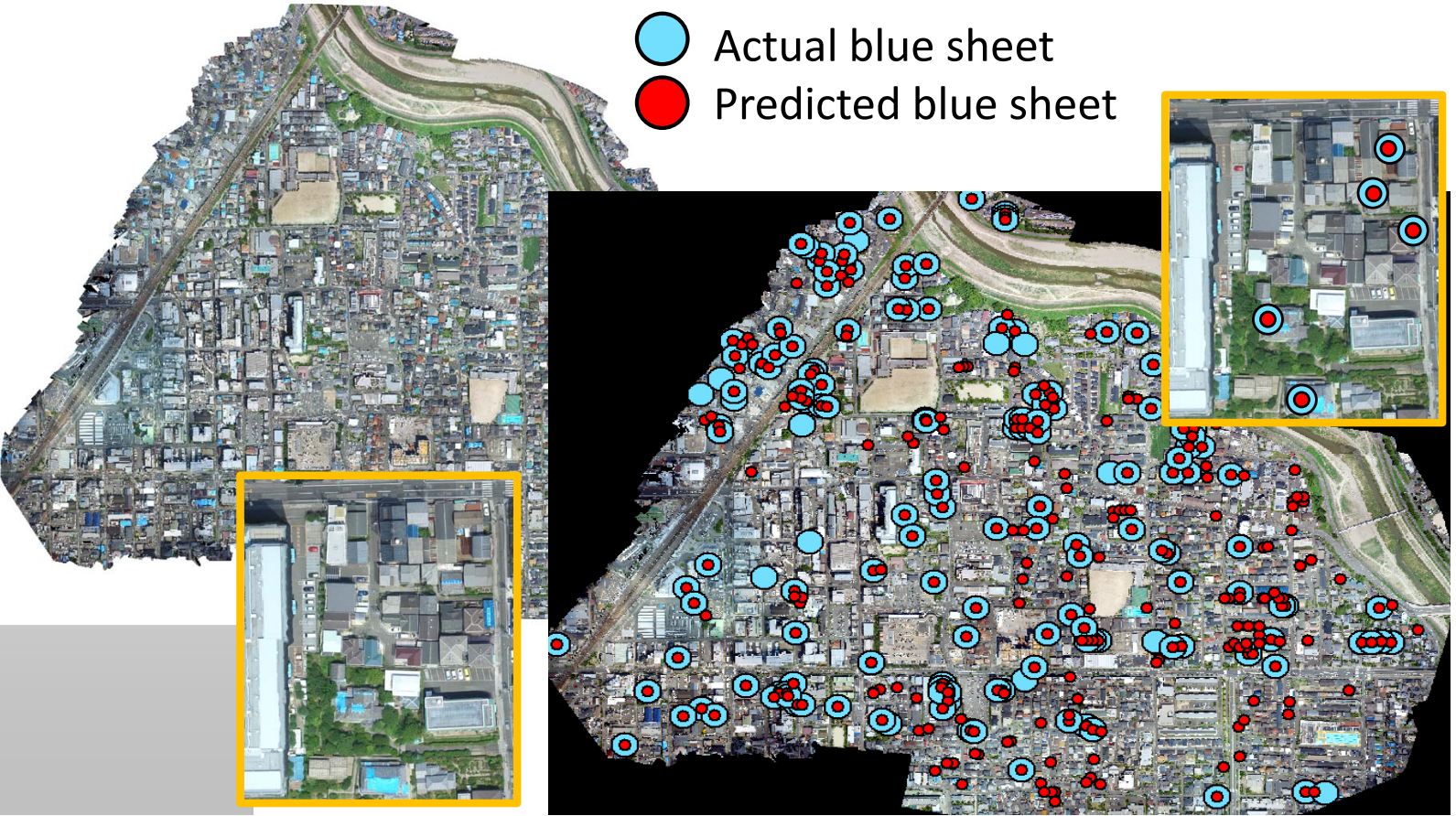

Damage Certification from Image

Real-time Tracking System for Damage Building in Disaster

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Service Image Movie(Under Development)

AI Technology is Powerful and
have possibility to change Crisis Response.

Social Implementation

Thank you for your kind attention!

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